Remarks

Claims 1, 3, 4, and 7, 8, and 10 have been amended; claims 2 and 11 have been cancelled; and claims 12-16 are new. As such, claims 1 and 3-10 and 12-16 remain in the application. Reexamination of the application as amended is respectfully requested.

Applicants appreciate the opportunity to interview with the Examiner on January 23, 2008 during which initially amended claims and the references were discussed. No agreement was reached. Subsequently, Applicants amended the claims to add the further limitations of applying droplets of conformal coating material to only areas of the substrate substantially conforming to a reverse of a mask and applying a droplet to coat a maximum area on the substrate of about 200 square micrometers. The additional limitations are discussed in paragraph 28 of the current application. Further paragraph 28 is amended to include material recited in original claims 9 and 11.

Claims 1-11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12, 14-17, and 19-20 of co-pending Application No. 10/699,627. Applicants are submitting a Terminal Disclaimer with this Amendment; and therefore, Applicants request that this double patenting rejection be withdrawn.

Claims 1-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Smith et al. (U.S. Pat. No. 5,747,102) or Ciardella et al. (U.S. Pat. No. 5,505,777) in combination with Hynes et al. (U.S. Patent No. 6,447,847) and Messerly et al. (U.S. Patent No. 6,253,957). Smith et al. relates to an apparatus for dispensing small amounts of liquid and viscous materials. Referring to Figs. 1 and 2 and col. 10, lines 51-59, "An air tube 150 connected to a pressure regulator 152 and a source of low pressure air (not shown) is coupled to the inlet of syringe 12 to force the liquid or viscous material into bore 22 and flow passage 24 about the valve shaft 42 at a constant pressure of about 4 psi to about 30 psi. In the default closed position, as shown in FIGS. 1 and 2, the cup-shaped valve seat component 78 is filled with a small

amount of the liquid or viscous material while the valve head 92 is seated against valve seat 38".

Referring to col. 11, lines 29-44, "To open the valve, valve shaft 42 is retracted to withdraw valve head 92 from valve seat 38. This step is accomplished by introducing pressurized air from air solenoid 128 into air inlet 124 and then into the air chamber below diaphragm seal 118. The air reacts with the seal 118 to move valve shaft 42 in a direction away from valve seat 38 and towards compression spring 142. During this period of operation, the heated viscous material flows between valve head 92 and the valve seat 38, and into nozzle orifice 100. At the same time, the viscous material located within valve seat component 78 and surrounding valve shaft 42, valve head 92, and valve seat 38 is heated by heating element 50 to a desired temperature. The resulting stream of heated, pressurized viscous material is dispensed through outlet 101 of orifice 100 of nozzle 40 as a thin stream that flows into a string connected to the outlet end 101 of orifice 100." Thus, material begins to flow through the nozzle upon opening the valve.

Referring to col. 11, lines 45-53, "A key aspect of the invention is to deform the adhesive liquid or viscous material at a high frequency so that the material acts as a solid for a very brief period of time and then returns to a more fluid state when it breaks away from the outlet end 101 of orifice 100. To accomplish the breaking of the string of liquid or viscous material from orifice 100, air solenoid 128 is turned off, and the spring 142 moves valve 92 against valve seat 38 to close the valve in a very short period of time." Continuing at col. 11, line 58-col. 12, line 11, "This is a positive displacement step which pushes the heated liquid or viscous material out of the outlet end 101 of orifice 100. The impact force of the closing of valve 92 against valve seat 38 generates a shock wave through the liquid or viscous material which, in combination with the sudden deceleration of the now flowing stream of material, overcomes the yield stress of the liquid or viscous material and breaks the stream of liquid or viscous material dispensed from the outlet end 101 of nozzle 40 to form a droplet of material. The thinner

the string of liquid or viscous material formed at the outlet end 101 of orifice 100, the more easily the yield stress is overcome. Note that nozzle 40 is positioned with respect to the valve head 92 so that the bottom surface of valve head 92 is adjacent to tapered inlet 98 of nozzle orifice 100 to minimize the amount of liquid or viscous material which can dissipate the shock wave generated by the closure of valve 92. The droplets of liquid or viscous material from nozzle 40 can be dispensed at a rate of up to 200,000 droplets per hour and typically, up to about 70,000 droplets per hour."

Referring to col. 14, lines 58-66, "The solder flux being used in carrying out the present invention is typically a low solids, solder flux containing small amount of solids, e.g. five weight percent or less, and the remainder a solvent such as isopropanol or a similar type of alcohol, a vehicle, an activator, a surfactant and an antioxidant. Note that the non-atomized application of the solder flux is particularly advantageous because there is no masking or overspray."

Ciardella et al. relates to a computer controlled viscous fluid dispensing system. Referring to col. 8, lines 16-36, "FIGS. 3 and 4 illustrate preferred form of the viscous material dot generator 12 that may be used in the preferred embodiment of our system. A nozzle 70 is rapidly retracted upwardly relative to a fluid feed conduit 72 in order to eject very small droplets or blobs of viscous material at a high velocity from a drop generation chamber 74 inside the nozzle. The nozzle 70 and the fluid feed conduit 72 are both generally cylindrical. The inner diameter of the drop generation chamber 74 is slightly larger then the outer diameter of the fluid feed conduit 72 so that the former can reciprocate relative to the latter. An elastometric cylindrical sealing gasket 76 which surrounds the lower portion of the fluid feed conduit 72 forms a seal between conduit 72 and nozzle 70, while allowing relative reciprocating motion between them. Upward reciprocation of nozzle 70 relative to the lower portion of the fluid feed conduit 72 forces the lower end of the feed conduit 72 into the drop generation chamber 74. The lower end of the fluid feed conduit 72 thus acts as a plunger or generation chamber 74. This

forces a minute quantity of viscous fluid from the drop generation chamber 74 through an exit orifice 78 at a high velocity."

Hynes et al. relates to a system having a multi-axes positioning system that supports and moves multiple conformal coating applicators that may be moved to tilted orientations with respect to a substrate. The conformal coating is dispensed using a dispensing valve or a spray valve. Referring to col. 2, lines 56-63, "Spray valve 32 is a pneumatically actuated valve that combines conformal coating with pressurized air to dispense an atomized spray pattern, such as, for example, a round spray pattern. Dispensing valve 34, also referred to as a "needle valve," is also a pneumatically actuated valve, but flows conformal coating through an interchangeable needle orifice."

Messerly et al. is a continuation-in-part of Smith et al. and discloses the same type of dispensing apparatus. The operation of the dispensing apparatus to dispense droplets is described in substantially the same manner, see col. 8, line 52 – col. 10, line 3 of Messerly et al.

In order to establish a prima facie case of obviousness, first, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the cited references, when combined, must teach or suggest all the claim limitations.

Applicants submit that a prima facie case of obviousness is not made because the cited references in combination do not teach, suggest or motivate one to provide method of noncontact dispensing a conformal coating using a jetting valve having a valve closure element, a valve seat and a nozzle as recited in independent claims 1, 3, and 4. Claim 1 requires "while moving the jetting valve, applying droplets of conformal coating material to only areas of the substrate substantially conforming to a reverse of a mask, thereby eliminating a requirement of applying a mask to the substrate prior to dispensing the conformal coating thereon by iteratively

initiating a flow of the conformal coating material through the valve seat and into the nozzle,

terminating the flow of conformal coating material through the valve seat by causing the valve closure element to engage the valve seat, wherein the conformal coating material downstream of the valve seat continues to flow through the nozzle with a forward momentum, and

breaking the flow of the conformal coating material from the nozzle by using its forward momentum to form a droplet of the conformal coating material, and

applying a droplet to coat a maximum area on the substrate of about 200 square micrometers."

Methods of noncontact dispensing a conformal coating having substantially similar limitations are recited in claims 3 and 4. Applicants submit that the methods recited in claims 1, 3 and 4 are not taught or suggested by the combination of Smith et al. or Ciardella et al. in combination with Hynes et al. and Messerly et al. Therefore, Applicants submit that claims 1-11 are patentable and not obvious under 35 U.S.C. §103(a) over Smith et al. or Ciardella et al. in view of Hynes et al. and Messerly et al.

Claims 12-16 are new, with claim 12 being the only independent claim of this group. Claim 12 includes many of the same limitations as amended claim 1; and therefore, Applicants submit that claim 12-16 are patentable and not obvious for the same reasons discussed above.

Applicants submit that the application is now in condition for allowance. The Examiner is invited to contact the undersigned in order to resolve any outstanding issues and expedite the allowance of this application.

Applicant does not believe that any fees are due in connection with this submission other than the Terminal Disclaimer and the fee for submission of a Supplemental Information Disclosure Statement. However, if such petition is due or any

other fees are necessary, the commissioner may consider this to be a request for such and charge any necessary fees to Deposit Account No. 23-3000.

Respectfully submitted,

WOOD, HERRON & EVANS, L.L.P.

/C. Richard Eby/ 02/11/08

C. Richard Eby, Reg. No. 25,854

2700 Carew Tower
Cincinnati, OH 45202
(513) 241-2324
(513) 241-6234 (Facsimile)